LOADING .30 CALIBER MATCH AMMUNITION

Roy F. Dunlap

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Almost every civilian high-power rifle competitive shooter must handload much or all of his ammunition if he is to be a serious contender in matches, and even the major military marksmanship units use handloads as well as arsenal made match and specially-loaded commercial match cartridges. These latter types are not generally available to the civilian and he couldn't afford them in the quantities needed anyway, so he must load his own. There are perhaps a dozen books of various sizes and quality available to the handloader, but none at all of much value to the competitive shooter interested in using match bullets at specific ranges and velocities. This booklet is an attempt to pass on the experience of myself and several top echelon riflemen of long experience and much experimentation. It is directed to the experienced shooter and loader, interested in loading the most accurate ammunition possible, knowing the general techniques of loading and understanding the use of loading equipment. As a competitive shooter myself, and a maker of match rifles, I have reached the conclusion that we have very nearly reached the ultimate in .30 caliber rifle accuracy, considering the advances in bedding materials, air-gaging of barrels, etc. This is not to say that all match rifles will be super-accurate, but only to point out that it is possible to make such rifles today as a common practice rather than as a one-of-a-kind special. Barrels will always vary in manufacture, we can expect improved steels, we need improved rear sights, but the average shooter can have a rifle he can trust . . . which is worthless unless he can provide it with ammunition capable of staying under one minute of angle in total group size to begin with, and not increasing greatly throughout the accuracy-life of the barrel.

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'Handloading' is a common term, means the 'hand' or individual loading of ammunition using all new components and including 'reloading', meaning the re-use of fired cartridge cases. The target shooter frequently buys new unfired cases, usually for the reason he can fire-form them in his own rifle's chamber and thereafter neck-size only, in this way getting the maximum number of firings the case can take. While economy is important, performance is all-important, and it is foolish to save a few dollars a year on cases and lose a few points a year in important matches. Maximum loads are the rule not the

exception, and cartridge cases must be of highest quality and uniformity for maximum accuracy.

Uniformity is the key to accuracy of course... in case weight, bullet weight, charge weight, as well as flash-holes, primer pockets, wall thickness of case necks, primer seating pressure and bullet seating pressure. First of all, this means a lot of time on the scale weighing cases and segregating in weight classes, which is a matter disregarded by many men who weigh bullets and powder charges with great care.

VARIABLE FACTORS

The individual rifle is the most variable factor the loader must contend with, primarily the barrel, assuming of course that stock is correctly bedded, buttplate at proper angle and non-slippable, etc. There are two schools of thought on the barrel/bullet dimension relationship: That groove and bullet diameter should be the same, or, that bullet should be up to .0003" larger than groove diameter of the barrel. I personally incline to the latter theory. You can have a practically perfect barrel and load practically perfect ammunition for it and still not achieve top accuracy if your bullets are a little small, especially after barrel has had a few hundred rounds through it, however, bullets can be a little big and do very well. So, if you have a .3085 barrel, don't try to use .3083 bullets. Do some micrometer work on various bullets, try those best suited to your particular barrel. Most of today's top-quality match barrels are air-gaged, come with dimensions on them, and the gunsmith fitting the barrel can give the dimensions. And, rifles should be range-tested every 1000 rounds, for the bullets and loads giving best results in a new barrel may not be the best after a season's use, and a different combination, perhaps even one that was third-best at the start, may prove out on top later on.

Headspace is a definite factor in accuracy in some calibers, specifically the 7.62mm NATO, or .308 Winchester. In the .308, while the same caliber nominally, and the same gages are used in headspacing (!) as for the 7.62mm NATO, there is a difference specifically concerning the National Match ammunition. A rifle correctly and closely match-chambered for the .308 Winchester, taking all commercial cases freely, will not begin to accept a 7.62mm Nat'l Match round. The latter is not only .004" greater in diameter at base ahead of extraction cut, it is about .005" longer in headspace requirement, mainly because of the neck-shoulder radius. Since practically all shooters want their NRA Match Rifles chambered to take the NM cases they therefore have slightly oversize chambers for the commercial cases, and, it is absolutely necessary to use these in loading the

best long range ammunition — they hold more powder than military cases and in this caliber maximum compressed loads give the best accuracy. However, under this condition new cases cannot always give best uniform ignition as some of the firing-pin's energy is lost forcing the cartridge to full forward seat in chamber. And this itself is variable depending on how the extractor grips the rim of each case. The best accuracy will be obtained from cases fired in the individual rifle and then neck-sized only for further use.

Concerning the belted cases, we are now much better off than in previous years, as the case-makers have more-or-less got together on belt/headspace figures. A very few years ago I could chamber a bullgun for Remington cases — tight — then put in a Western case, close the bolt, shake the rifle and hear the rattle. Chamber for Western, you couldn't close the bolt on a Remington case. Now things are pretty well standardized, however, Magnum match rifles should be chambered on the minimum side, to just take the minimum or 'Go' gage, then checked to see that bolt will close freely on say, five out of six new cases. Discard the odd cases, use for experiment, or give to some hunter. The reason for close headspace on the magnum match rifle — and a chamber not oversize in diameter — is to prevent the case expanding on first firing at front edge of belt, visible as a tiny step. This makes cases chamber and extract stiffly in future firings and often makes cases unusable after a couple firings. Also, of course, an extra-deep chamber can give same results on initial firing as mentioned for .308 in preceding paragraph. So, ask the gunsmith to use discretion when he chambers your bullgun and your loading problems will be fewer than they might be if he chambered as for a hunting rifle.

Temperature affects accuracy as well as sight elevation... all experienced riflemen-loaders know that full loads safe in cool weather can be too 'hot' on a hot day and blow primers. Well, some powders can give very accurate loads at one temperature range, and be sad at others. Years ago in testing a .308 free rifle at 300 yards I found one load which would stay in 2" as long as you cared to shoot, at 70 to 80 degrees Fahrenheit. At 60 or 90 degrees it wouldn't keep ten shots in 4". Therefore, loads must be checked in the temperature range in which they will be most used to be sure of best performance. As a general rule, higher temperatures don't harm accuracy, assuming of course they don't raise pressures to danger point, but a pronounced drop in temperature can open up groups visibly sometimes. It is just as if your powder charge was two or three grains less than normal.

CONTROLLABLE FACTORS

You can control to some extent the bullet-barrel relationship, big bullets for big bores, select powders suited to each case size, barrel length and so on. The different powders serve different case sizes and purposes — that's why they are made. Don't try to make them work out of their given channels — let the experimenters play. Competitive shooters can't waste good barrels and time trying to be different. Some powders are 'dirty' (leave considerable residue in cases and barrels) others are 'clean'. Commercial 4895 and 4064 have very close burning rates so that the same charges can be used in most cases, yet individual bullets and rifles can prefer one to the other. Don't choose a powder for convenience, cost or possibly even longer barrel life unless it also gives the best accuracy. Only results count. DuPont 4350 is considered a long-barrel heavy-bullet powder: If it delivers the accuracy out of your 24" barrel, use it. I've seen men shoot winning scores at long range and spray unburned powder grains out the muzzle every shot.

I

CASE SELECTION

New cases are to be checked for flash-hole burrs — simplest thing to do is clamp a sharp drill-bit in a vise, ⅛ to 3/16" diameter OK— drop every case over it, spin with fingers. If any irregularities are visible in hole in pocket, do same at this end of hole. Many men customarily run a No. 45 (.082") drill bit through flash-holes to catch any undersize ones. New primed cases are usually decapped and neck-sized at same time, in readiness for the flash-hole check. Few men trust the primers coming in primed cases, not knowing if they have been subjected to dampness, age, etc. The necks are easily checked visually for square mouth — any 'slant' is evident — and miked for wall-thickness. You need a case-neck micrometer, or tubing mike, or gage made for the purpose. Discard cases with necks varying more than one-thousandth inch in wall thickness. The .308 cases, both commercial and military, and the .300 Winchester Magnum cases seem to be very uniform. Most .30-06 military match cases are quite uniform, but commercial .30-06 often very poor—necks .010" at one point, .014" another. New cases usually need a pass with chamfering tool inside and out the mouth to clear burrs and sharp edges. Cases are then segregated as to weight, usually forming two groups, light and heavy, with a very few running beyond limits for either group. A one-grain tolerance, that is, a half-grain over or under the mean weight will cover most lots of cases so that no great quantity need be discarded from the matched lots.

Fired cases, of course segregated first into lots of same make, year, etc. and free of sand, dirt or other agents, are first neck-cleaned by a .30 or .32 caliber brass brush — larger sizes can be used, these are the most convenient — in drill press, electric drill — any power source with a chuck to take brush shank, just by holding in hand and running case on and off the spinning brush. Then decapped and neck-sized, primer pocket cleaned by small rotary brush or hand tool before repriming. It is assumed that flash-holes are OK and cases kept in matched lots by weight, as with new cases. Competitive shooters seldom worry about cleaning cases as they seldom work with more than two hundred at a time in a given caliber and so discard them fairly often. A few people work with a large number of cases, loading each perhaps once a year, and do clean in large quantities every few years. Tumbling in a large tumbler with polishing agents as used for polishing newly-made bullets is the best way, I think. For smaller quantities chemical cleaners are more convenient, these being the industrial silver polishes, etc. which are also specifically sold as case-cleaners. There are even some high-powered detergents made for dishwashers that will do a good job on cases. Just boil on stove a few minutes. The acid types of cleaners should be used just as directions call for... some will eat up brass as well as dirt and corrosion. Cases should always be decapped and sized as desired before cleaning, and be dry and clean inside before using.

Case life varies with the use, type of sizing, caliber, rifle chamber, loads used, not to mention case variations themselves — hard, soft, necks not annealed, necks annealed too much, etc. Normally, commercial cases in .308 and .30-06 can be used five to fifteen times for slow fire. For rapid fire with fast-burning powders, three firings; slow-burning powders, five or six. Usually, for rapid fire a new case can be fired, then re-used with neck sizing only, then must be full-length sized for the third firing. After that cases may stick somewhat on extraction even if full-length sized. Military cases are often a little soft and extract harder than commercial. A rough chamber of course makes any case stick, scratched sizing dies don't help, but clean cases do help. Don't let the ammo get dusty.

Slow fire cases are neck-sized only 1/16 to ⅛" from mouth, and slight difficulty in extraction is not objectionable. Cases initially expand ahead of the solid base; full-length sizing reduces this area, repetition eventually weakens the case at this point so that it will rupture, cracking partially or completely, the latter called case separation as the head comes out and leaves remainder in chamber. It is therefore wise to avoid all unnecessary full-length sizing and this consequent 'working' of the brass.

Shooters often replace shot-out barrels, find the new chamber won't quite accept cases fired in the old so must size still-usable cases. I have found the best way to do this is with a full-length die with neck portion ground out so that neck is not sized. The die is adjusted by trial and error to just size cases enough to enter the new chamber, then they are neck-sized and loaded in regular way. Some cases are soft — wrong alloy or anneal in manufacture — and do not retract well from chamber wall after expansion in firing — these will be sticky no matter what you do. In cases with long shoulder, much taper, long neck, etc. the brass flows forward with a firing and cases lengthen. The .30-06 is subject to this to a fair degree, the .300 H & H quite an offender. Necking down the .338 Winchester to form the .30/338 sets up a condition whereby a ring of thickened brass develops at juncture of neck and shoulder with a few firings. In the .308 and .30-06 Western match cases, principally the .308, necks become thinner with repeated use (latter case thin to begin which, which is why it is desirable, being able to hold more powder than any other .308 case). Two sizes of expanding plugs can be kept, one a little undersize, for such cases . . . and keep them well polished, buffed often on polishing buffer if possible. They must slide, not scrape through necks. And of course, never mix up the thin-necked cases with others.

II

BULLET SELECTION

All bullets should be weighed, mainly to get the odd light one. Actually, slight variation — 1/10 grain plus or minus — seems to have little effect on the accuracy although we try to do much better in weighing, but any under weight might be due to an air bubble in bullet between jacket and core. Shoot such a bullet at long range and it can land anywhere on the target. For the same reason, hollow points should be checked for bits of polishing agent left inside from the maker's tumbler. A bullet's rotational speed is high, per its velocity in feet per second, and anything or any weight off-center cannot but make the bullet wobble and lose accuracy as its velocity lessens. At short ranges there is little damage to group, but at long range you can get flyers and hollows, or ring-type groups — all around the middle of bull but seldom center.

Visual examination will detect any defective tip, base or seam in jacket. Uneven tips, within reason, do not detract from accuracy as even a sharp pointed bullet pushes a ball of compressed air ahead of it which changes little in its complete course of flight over normal range distances. Any defect of base or

boattail does affect accuracy. Bullets should be straight and true on center axis, not bent like a banana. Spinning is the only way to check this, and the presently available spinners which hold bullet in centers at each end are not too good. What is needed is a spinner with collet setup to hold bullet at base end exactly as in a cartridge neck and rotate against an indicator to show where the point points. In other words, to find out how concentric tip is with bore-bearing area or section of bullet. You can tell a lot by just rolling loaded rounds on a piece of plate glass, providing you tool neck-sizes concentrically with case body and bullet seater seats straight.

There is no defense against the bullet with hidden defect. Jacket metal which draws unevenly, a punch with a burr that makes a scratch on inside of the jacket, metal too hard — these can cause bullets to come apart in the air anywhere between muzzle and target. Walk down any rifle range and you can find a split jacket with core missing — somebody got a miss on that shot. Soft jacket metal can foul a barrel so that accuracy is affected; a bullet soft overall — thin or soft jacket and soft core, can slug — be pushed out of shape by pressure — in the barrel and fail in accuracy. However, if purposely designed, such bullets can be good... about fifteen years ago we were happily shooting the Norma 180 grain match bullet... it was the tri-metal (plated steel) jacket, thin, soft core, made oversize — .309 and over — shaped like an egg, no straight bore-bearing area, etc. It squeezed down and fitted practically all .30 barrels, shot beautifully. Then something happened, probably some experimenter screamed they were too big, weren't shaped right, or such, the bullet was changed to conventional dimensions, and we quit using Normas, because they didn't shoot so well anymore.

The bullet manufacturers of today are doing a very, very good job. They occasionally make a lot that escapes detection until it gets out which doesn't perform, but endeavor always to produce the best possible bullets. They themselves are somewhat at the mercy of metal producers and so jackets can and do vary slightly from time to time, for better or for worse, not often for worse. About all any shooter can do is keep buying and testing, and when you find a batch your rifle likes, go get all you can of that particular run. Never operate on a box-to-box basis, but base loading for competition on a quantity of at least 1000 bullets of same run, or lot.

III

PRIMERS

There is constant experimentation by literally all makers of primers to find improvements, but I believe every primer available to the handloader at present — 1967 — is the lead steafnate type, basically the same formula. There are variations in cup materials, anvils, waterproofing and amounts of components in compounds perhaps, but the standard large rifle primers are very uniform in performance, regardless of maker. Primer pockets in cases sometimes vary from lot to lot of cases, and occasionally one primer will fit better than another, but aside from this, I see little choice between them. Because of cup material, one primer may show more 'pressure' flattering than another, leading shooters to believe the primer is higher pressure, or raises pressures, which is not correct. The "Magnum" primers are very uniform also and I believe practically every top shop uses them in .30-06 and Magnum long range ammunition. However, they should not be used in .308 Winchester... not only raise pressures but give blown groups.

IV

THE MECHANICS OF LOADING

Here the individual touch and technique really comes in. Trim your cases? If they need it; usually a case needs trimming only once — lasts for three firings, so once for a half-dozen reloads is about all. Keep the dies clean and use as little lubrication on cases as you can. And wipe off cases after sizing. Be extremely careful to never get any kind of oil into a primer pocket, primer seating cup, plate you lay primers on, etc. Oil and primers just don't go together. Modern priming compounds can take water better than oil!

The simplest way of lubricating the case mouth for neck-sizing is to oil a patch well, keeping it flat on bench, press mouth of case straight down on it then into a thin layer of Motor-Mica. Puts a ring of lubricant inside and outside mouth, just enough to make neck sizing smooth. Full-length sizing, best lubricant is the Standard Oil synthetic lanolin made as a non-ferrous metal drawing lube — it is sold by most loading tool makers as a sizing lubricant. Saturate a patch, wipe cases and size... being careful not to get any buildup in the shoulder of die, which will dimple the cases. In fact, you can usually do fine by lubricating every third case only.

You must feel the expanding plug pull uniformly from the cases as you operate the tool: cases which come too easy or too hard are to be segregated and used in separate boxes of ammunition. The same with primer seating. Primers should seat with even — uniform — pressure, firmly to bottom of pocket, and preferably with a straight-line punch tool, such as a separate priming tool rather than the swinging arm used on most C, D and O type tools. It is common practice with the latter types to seat the primer, turn case half-way around and again press primer with priming arm.

The tedious part of loading is weighing powder charges. There are many powder scales on the market and price is no indication of efficiency. Some of the cheapest made are far better than some of the most expensive types available. Any one is accurate enough for the best loading, used properly — there are two faults common to most powder scales which must be known and watched for .. these are side-canting of arm in its bearings, that is, the arm moves out of one exact vertical plane, pointer swinging behind or in front of its corresponding scale, and, sluggish movement, in which you get a different weight if powder is added to bring pan **up** to balance than if pan has overcharge and powder is removed to bring pan **down** to balance. These faults are easily noted and corrected for, by making sure to keep pointer end of beam centered at one vertical plane or swing, and weigh all charges the same way, commonest system being to use a powder measure set light, throw charge on pan, then add powder grains to bring up to exact weight. The best way to check scale performance is to weigh back . . . weight out, say, ten charges, dump in cases, then go back and dump each one on the pan and see they all check out same as they did the first time. Graduated scales often do not check out exactly with weights, varying up to several tenths sometimes. This is not especially important since uniformity between your own charges is desired — your 57 grain load might actually be 56.8 and your friends' be 57.1, for instance. Most powder scales now made have 'dampers' of various types designed to slow the swinging of beam and so speed up operations. Improperly used they can contribute to variation in charges — heavy oil in the oil-paddle type slows too fast... best to use just plain water in the tank. Mechanical dampers are worthless, magnetic can be good. I just hold the pointer centered with fingers when putting pan on scale or adding powder until the final few granules.

In loading the 7.62mm NATO, or .308, it is necessary for most full charges to use a drop-tube funnel, a powder funnel with six to ten-inch tube attached, in order to get all the powder into the case. These tubes, brass or aluminum, can be obtained

at any hobby shop in 12" lengths in various sizes, and easily attached to standard powder funnels. They enable powder to be trickled slowly, which with the added impetus of the several-inch drop, pack it evenly in the case and so use less cubical space in the case than if just poured in abruptly through a normal short funnel. Most of these loads still require considerable compression of the powder by bullet which in this caliber is not dangerous and indeed desirable, excepting of course the fast-burning high-pressure powders such as 3031, 4895 and 4320. Within reason, 4064 and 4895 charges heavy enough to require a little compression are safe, though nothing like the pressure for the 48 grain 4350 load, which is safe — and low-pressured — with even 200 grain bullets. Shorter drop-type funnels can be used in the capacity loads in .30-06 and magnum calibers, but are seldom necessary.

Bullet seating is best done with a straight-line type tool, Wilson or Belding & Mull hand type, or Vickerman in loading press. The .308 compressed loads require a press, of course. Where the bullet-seating die is a fairly close fit on the neck-sized case, the standard bullet-seating procedure in the tool gives quite satisfactory straight seating. In my own experience at least, the .308 seating dies are luckily more satisfactory in this respect than most other calibers. With any seating system you must use your own judgment, principally sense of feel, in determining the pressure or force necessary to seat all bullets in a given 'run' or lot being loaded — if seventeen out of twenty rounds seat with one blow of the hand, using a hand seater, and three require two or three blows — you find three more cases that'll let bullets seat with one wallop each! We are trying to control—in reverse the "Bullet Pull," that is, the force necessary to pull the seated bullet from the loaded case. Since only factories and arsenals have the laboratory equipment needed to physically measure this and check variations, the handloader can only try for an even neck-tension on bullets by a uniform seating pressure. If they all go in with the same pressure, they should all go out with the same pressure. Using the minimum amount of neck-sizing needed to hold bullet in place against any accidental movement in case aids greatly in this matter of equalizing bullet pull by eliminating most of it. The self-evident reason of course is that a tightly-held bullet requires more force to leave the case, thereby building up the pressure in case slightly and creating a higher velocity and so changing point of impact. Bullet pull, light or heavy, is not important so long as all cartridges being fired have the same, but you can't mix them up and hope for tight groups. In match shooting it is wise to discard immediately any case that has just fired a shot definitely off call. Whether the case is at fault or not for the high or low shot you can't tell, but throw it over the bank so you won't be

wondering next time when you might have the same thing happen.

Length of load is determined by your rifle's throating... in rapid fire you load cartridges as long as you can and still have them work freely through magazine and chamber freely in rifle. For slow fire, just take a fired case, neck size just enough to hold a bullet, about 1/32", seat a bullet long, put in rifle and close the bolt... throat will push the bullet back to perfect seating. Use this dummy to set bullet seater. Each individual type and make of bullet to be used should be so checked — they won't all be the same due to different ogive. In fact, bullets of same weight, type and maker can vary from lot to lot somewhat, as manufacturing dies wear and are replaced, it being almost impossible to make perfect duplicates year after year. There is a difference of opinion among good riflemen as to bullet seating, as to bullet shooting best if just touching the throat, or being very slightly forced into it. They shoot either way very well. Some of the people who claim they have to force bullet into rifling to get good accuracy at long range happily proceed to shoot tight groups with 300 rapid fire ammunition loaded so that bullets are moving 1/16 to ⅛" before touching the throat...

Rapid-fire ammunition is just as important as that loaded for long range slow fire. The very top competitors have long known this, but the average target shooter didn't think it really mattered until the big-bore decimal targets appeared. The 300 yard rapid fire ammunition must have cases that not only go into the chamber freely but come out freely after firing — not all will do this last, incidentally. If not full or almost full-length sized, cases should have necks sized ⅛". This is normally enough to hold bullets firmly against moving back in cases under recoil while in magazine. Case treatment, selection, bullet selection, etc. are all as important as for the long range slow fire load. You are working against a three-inch X-ring and only the very best rifles and ammunition will group 3" at 300 yards, under perfect conditions and with no human error figured in. Add these and you need the 3" group to stay in six inches! In the prone rapid fire position the shooter does not have a great deal of leverage on the bolt, not nearly as much as in the sitting position, so cases must extract freely. If your chamber is a little rough, or cases a little sticky, you can beat the situation in emergencies by oiling cases lightly just before firing — put a drop of oil on thumb, rub with forefinger, then rub the cases. Just a tiny film of oil is wanted, so little it is hardly there.

Ammunition for 200 yards rapid fire is less critical as to cases, because you can work the bolt better. Cases past use at

300 can still be used a time or two here, and for the standing slow fire, you can use everything rejected from other stages, discarding after firing or keeping for further standing practice, etc.

It has long been the custom to carry ammunition packed bullets down, though few remember the reason — in the old days if a grain or two of powder worked into the flashhole and got in with the primer, you suddenly had a very high-pressure round. With present primers, powders and cases, this is not important ... I have even carried ball-powder loads in all positions without a single hot round turning up. Carry any way that is convenient. Ammunition should be stored in air tight containers, such as GI ammunition cans, more for corrosion resistance than anything else. Brass loves to discolor itself anyway, and if there are any industrial contaminents in your local air they'll show it up. Handloaded ammunition stored over any length of time, a year or more, may lose some accuracy through changing neck tension. Case necks get tired holding bullets, especially if it is a full, tight neck-sized situation. This can be overcome in most cases by simply seating the bullets a little deeper, changing the seating on all so they are again somewhat uniform. "Breaking the seal" or re-seating, often helps old military ammunition also. You can frequently cut the size of groups in half by just running the ammo through the seating die, pushing bullets in a little.

A further point, in slow-fire ammunition: your rifle may have a sloppy chamber in which cartridges lay off center in initial firing and expand unevenly. In this circumstance fired cases will not usually enter the chamber freely except in the same relative top-to-bottom position they were first fired in... lopsided. Determine by trial and error how they enter freely, usually easily done by noting off-center firing pin indentation, all usually the same, then put a small mark with a felt-tip marking pen, or use a case-cleaning compound, on base of case from pocket out to edge to show top or upright position. Load the cases as usual and load into rifle for firing with the mark up and you should have no trouble or fault with the accuracy. They won't roll so well on a glass plate, though. Somewhat the same condition can be found in the occasional rifle with good chamber, but bolt-face not at ninety degrees to its axis, in other words, a slanted bolt face which puts an angle on fired cases, the base expanding unevenly to match the bolt face. Easily checked by standing two fired cases upright on bases on a smooth surface and rotating them to see if angle of taper changes as they turn. This condition also calls for cases to be indexed for firing as described above. Such rifles usually require full-length sized cases for any rapid fire operation.

LOADS — GENERAL INFORMATION

The following tables of loads cover most of those in general use at present by competent match riflemen. The velocities given are chronographed not estimated, but please remember they mean very little at all, as velocities can vary tremendously between similar rifles with the same load, between a new and worn barrel in the same rifle, because of different lots of powders, etc. Hunters and experimenters are greatly impressed and wildly enthusiastic about velocities, but target shooters seldom care about anything except accuracy. The match rifleman is interested in chronographing his rifle and loads whenever he can, to check the 'spread' or difference in high and low velocity between rounds fired in a check... the lower the spread, the more uniform his ammunition and therefore more accurate.

The .30 caliber 168 grain match bullet seems accurate from 2200 to 2800 FPS — I have not heard of anyone pushing it faster. The 180 grain and heavier boattail match bullets are accurate from 2200 to 3350 FPS, depending on case fired in, powder used, etc. Accelleration is a point understood by few people — it is the reason specific powders give accuracy with specific bullets, while another powder, pushing same bullet at same velocity, gives poor accuracy. To illustrate — I had a very accurate .30-06 match rifle, capable of 6" at 600 yards with a 4350 load: I chronographed, then used a 'hot' lot of 4831, worked up to same velocity with same cases, bullets and primers, and range-tested ... It shot about 28". This same lot of 4831, in the .300 Winchester Magnum (28" barrel bullgun) is magnificently accurate, gives over 3250 FPS with 185 gr. Lapua bullet, in one barrel chronographed 3360! It obviously ignites and burns well in the big case. Barrel length not a factor as the .30-06 also had a 28" barrel.

In the .308 caliber there is a fairly sharp division at the 180 grain bullet: any lighter weight uses appreciably greater windage correction than heavier. With the 180 or heavier bullets, windage deflection is practically the same as for the .30-06 using the same bullet at higher velocity. In general, to my mind there are four steps in .30 caliber velocities, affecting not accuracy, but wind-bucking qualities. From 2400 to 2700 FPS, 2700 to 2900, 2900 to 3200, and the 3200 FPS and up class. Within each range, with the same weights of bullets, I find the windage factor practically the same... If you need six minutes windage at 1000 yards with a .30/338 at 2950 FPS, you'll also need six minutes with a .300 Winchester at 3150. Above 3200 FPS there is a very appreciable gain in remaining velocity at 1000 yards, but very little gain in wind-bucking so that you need almost as much windage as the lower-velocity class. I don't understand

all I know about such things, but I do remember one law of physics that the muzzle velocity boys don't, which is that the faster a projectile is accellerated in an atmosphere, the faster it decellerates... translation: bullet takes about same time to get to target whether it is fired at 2900 or 3000 FPS to start with. It is generally considered that most hunting-type bullets in the various sporting calibers deliver their top accuracy at from 5 to 7% below maximum load. With the .30 caliber match bullets — heavier types — top accuracy is usually, not always, found at the maximum velocity and pressure for the cartridge case involved, or very, very slightly below maximum, for the 600 and 1000 yard ranges. Often such loads are not especially accurate at short range, which misleads many shooters. They test a recommended load at 200 yards, get poor results, work up a nice, stabilized-bullet load at 200, then go and lose matches at 1000. The best example I can think of is the old pre-World War II Western .30-06 Handloaded Match Ammunition... at 200 yards it would shoot around 6"; at 300 yards it would shoot around 6", and at 600 yards it would shoot around 6"! In the .308 caliber you can find several loads which are tops at all ranges from 100 to 1000 yards, but in the .30.06 and magnums, they hardly exist at all.

7.62mm NATO — .308 WINCHESTER

Unprimed Case Weights:

Western Match	153	Grains
Western Super-X	154	
Winchester Super-Speed	153.5	
Remington	166	
Lake City National Match 1966-7	179	
Lake City National Match 1963-4	183	

It is obvious that the Western/Winchester cases have greater cubical capacity and are able to hold more powder than the others, and it should be obvious that maximum loads given for them should not be attempted in other cases. Also, the slight weight variations are unimportant, no doubt due to normal variations in manufacture of different lots. A one-grain variation in a cartridge is slight. Cases for military ball ammunition made by commercial firms will normally be the same as for their commercial ammunition, excepting that primers may be crimped in. Most loads with the 168 grain match bullet can give good accuracy at 600 yards, but blow around in wind. Use only in very calm weather for long range.

Use standard large rifle primers. Do not use 'magnum' primers in .308.

Bullet	Charge	Powder	Case	Velocity	Purpose
125 gr.	46	3031	Western	3000 FPS	200 Yards
	48	4064	Western	3000	200 "
150 gr.	46	4895	Any	2825	200 "
	48	4064	Western	2800	200 "
168 gr.	39	3031	Any	2550	200 & 300 Yards
	40	3030	Any	2600	200 & 300 "
	42	4895	Any	2625	200 & 300 "
	43	4064	Any	2640	200 & 300 "
	45	4895	Western	2675	All Ranges
173 gr. NM	42.5	4895	Military	2550	Duplicates NM Loading
180 gr.	43	4064	Western	2575	600 Yards
	42	4895	Western	2560	600 "
	48	4350	Western	2610	600 & 1000 Yards
190 gr.	43	4064	Western	2550	600 & 1000 "
	48	4350	Western	2550	All Ranges
200 gr.	48	4350	Western	2540	600 & 1000 Yards

.30-06

Unprimed Case Weights:

Western/Winchester	183 Grains
Remington	190 Grains
L.C. Arsenal NM	192 Grains

Loads given for Western Cases need be reduced one grain for others.

Bullet	Chrg	Pwdr	Primer	Case	Velocity	Purpose
125 gr.	51	4895	Standard	Any	3065	200 Yard Load
	53	4895	Standard	Any	3125	200 Yard Load
	54	4320	Standard	Any	3100	200 Yard Load
150 gr.	45	4895	Standard	Any	2725	Mild, accurate 200 Yd. Load
(Sierra)	48	4320	Standard	Any	2800	Mild, accurate 200 Yd. Load
	48	4064	Standard	Any	2825	Mild, accurate 200 Yd. Load

Note: Except in 14" twist barrels, accuracy can decrease by loading this bullet to higher velocities.

168 gr.	47	4064	Standard	Any	2650	Good 200 & 300 Yd. Load
	47.5	4895	Standard	Any	2675	Good 200 & 300 Yd. Load
	49	4320	Standard	Any	2650	Good 200 & 300 Yd. Load
	50	4064	Standard	Any	2800	Good 300 Yard Load
173 gr.	47	4895	Standard	Military	2700	Equals Nat'l Match Loading

NM First three loads given for 168 gr. bullet can be used with this bullet also.

180 gr.	49	4064	Standard	Any	2725	Good 300 & 600 Yard Load
	49	4064	Magnum	Any	2750	Good 600 & 1000 Yd.
	56	4350	Magnum	Military	2850	Good Long Ranges
	57	4350	Magnum	Western	2875	Good Long Ranges
190 gr.	56	4350	Magnum	Western	2725	Good Long Ranges
	60	4831	Magnum	Western	2760	Good Long Ranges
200 gr.	55	4350	Magnum	Western	2700	Good Long Ranges
	58	4831	Magnum	Western	2625	Good Long Ranges

Note: ALL LONG RANGE LOADS LISTED ARE MAXIMUM! DO NOT INCREASE.

.300 H & H MAGNUM

Bullet	Chrg	Pwdr	Primer	Case	Velocity	Purpose
180 gr.	67	4350	Magnum	Western	2900 FPS	Long Range
	65	4064	Magnum	Western	2900	Long Range
190 gr.	66	4350	Magnum	Western	2875	Long Range
	70	4831	Magnum	Western	2975	Long Range
200 gr.	66	4350	Magnum	Western	2850	Long Range

.30/338 WINCHESTER

Loads applicable also to .308 Norma Magnum. Winchester/Western cases only, Magnum primers, Long range loads. 28" Barrels.

Bullet	Charge	Pwdr	Velocity
180 gr.	69	4350	3000 FPS
190 gr.	67	4350	2950 FPS
200 gr.	67	4350	2925 FPS

Comment

These are the 'standard' loads now used by competitive shooters at 1000 yards. They are not absolutely maximum, but it has been found that nothing is gained in any respect by loading heavier in this caliber.

.300 WINCHESTER MAGNUM

Winchester/Western Cases, Magnum primers, loads for long range. 28" Barrels.

Bullet	Charge	Pwdr	Velocity
180 gr.	78	4831	3325 FPS
	73	4350	3225
190 gr.	72	4350	3200
	77	4831	3280
200 gr.	72	4350	3175
	76	4831	3220

Comment

There is considerable variation in lots of 4831 powder, therefore these loads can be off as much as 1½ grains either way... check your own powder out for maximum loading usable—slight backup of firing-pin indent in primer best check. Extra-strong firing-pin spring, such as Wolff, should be used in all Magnums.

Note: In this caliber it is possible to get too much 4831 in the case!

There are so few rifles remaining in use in calibers such as .300 Pfeiffer, .300 Ackley Long Magnum, etc., and so little data on their loading/chronograph results that I am omitting specific loads for them.